The Impact of Poor Contemporaneous Project Records on Claims Preparation and Expert Analyses

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ABSTRACT: During the last decade or so, a disturbing trend has developed related to the implementation of project progress and performance evaluation methodologies on construction projects, and particularly so on large complex industrial projects. That negative trend is that contractors, including some of the largest and most sophisticated in the world, often fall far short of specific contract requirements and reasonable expectations pertaining to preparing and maintaining essential project documentation, and specifically, that associated with the proper monitoring of project progress and performance. This phenomenon is particularly perplexing in that the documentation failures have occurred despite the fact that more sophisticated project management tools are now available to carry out these critical activities.

Unfortunately, substantial claims for costs associated with schedule delays and disruptions as well as the accompanying loss of labor productivity are commonplace on these projects. The impact of poor contemporaneous documentation on the claims preparation effort and related expert analyses can be profound, both during project execution when attempts to recover costs through the change order process occur, and after project completion when the contractor submits a formal claim. Not only does the lack of proper documentation contribute significantly to poor project performance and outcomes, but also it can make the change order and claims process far more difficult, expensive, and in most cases, result in less reliable analyses offered in support of such change orders and claims.

This article will discuss a variety of methodologies related to labor productivity analysis at a summary level. As the title suggests, the primary emphasis is directed toward the impact to the retrospective analyses when the extent and quality of available documentation is less than that reasonably required to perform supportable analyses. This article also includes a discussion of possible ways that an owner can be more proactive in assuring that reasonable project documentation is submitted by the contractor.

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1. INTRODUCTION

Mark Twain once observed that "it is not so much what I don't know that hurts me; it is rather what I think I know that just ain't so." This simple aphorism succinctly defines the most damaging aspect of poor project documentation, which is that it causes project personnel to believe things to be true that in many cases are not, and in doing so, often take actions that have significant negative consequences to schedule, performance, and project cost.

In addition to the negative consequences of making real time management decisions based upon unreliable project information, poor project documentation also has a significant negative impact on the ability of the contractor to provide the supporting documentation needed to substantiate claims that may arise during the course of the project or after the project is completed. This failing in turn often leads to an adversarial relationship between the contractor and the owner, as the owner is typically reluctant to approve change order requests and impact claims that are not reasonably substantiated with proper documentation. That reluctance is particularly true when the contractor does not provide substantiation consistent with its pre-contract representations or the contract requirements. Owners typically react with significant skepticism to such lack of transparency and routinely reject such poorly prepared claims for failure to meet the contract requirements.

Contractors then respond angrily to the owner's refusal to approve the requested change orders or contract claims, and generally accuse the owner of "hiding behind" contract technicalities in order to avoid responsibility for what the contractor believes to be legitimate change orders and extra work. This deterioration of mutual trust, where each party is convinced the other is not operating in good faith, sets the stage for even more acrimonious dealings. Unfortunately, once this process is set in motion, the project often greatly suffers. Far too much management time and energy is spent on posturing, building, and/or defending against claims; time and energy which is far better spent on building the project. When such a project dynamic manifests itself, significant claims and even arbitration or litigation generally follow. Such an outcome is unfortunate because it is almost always foreseeable and oftentimes avoidable.

When this point is reached in the project life cycle, the impact of poor project documentation continues unabated. Once the commercial relationships have so deteriorated that legal proceedings have commenced, the true nature and quality of the contractor's records will be exposed through the discovery process. It is then that the ultimate impact of poorly kept project records will become manifest as the parties attempt to utilize those records for the preparation and defense of the various claims submitted by the parties.

2. TYPICAL CONTRACT REQUIREMENTS FOR PROJECT DOCUMENTATION

Virtually all construction contracts impose specific obligations on the contractor to set up and maintain a system and/or process to accumulate relevant project management information. Such information typically includes project schedules, progress measurement (percent complete reports), labor utilization, earned value data, labor productivity reports, etc. that are associated with the Engineering, Procurement, and Construction activities pertaining to the contract scope of work. However, typical contract language often addresses the record keeping and reporting requirement in somewhat generic terms. For example, the contract language may require the contractor to utilize particular commercially available scheduling software to prepare and submit project schedules, but without imposing specific conditions or limitations on the use of such software. Similarly, a contract may require that the contractor provide monthly updates with general status information, but it does not specify the particulars of the percent complete data required or even require the contractor to submit its baseline and schedule updates to the owner in executable format. While the contract requirements may be less specific than desired, the intended reporting requirements are generally consistent with the data and information routinely captured by the contractor's internal project record keeping systems.[1]

[1] Typically referred to as a Project Management Information System (PMIS), Construction Management Information System (CMIS), or the like.

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3. TYPICAL CONTRACTOR DOCUMENTS

Two categories of documents that the contractor should maintain during a project include 1) bid documents that establish the basis of the contractor's cost estimate and basis for its bid price, and 2) periodic progress and performance documents that describe the status of the schedule, labor utilization, and percent complete at frequent intervals during the project. These two categories of documents are discussed below.

3.1 BID DOCUMENTS

The universe of information and data that will ultimately make up the "project record" begins with the bid documents.[2] The bid documents are the wellspring from which baseline data flows and which is ultimately reflected in the contractor's project information system. The bid documents are the basis of the contractor's cost estimate and upon which the contract price is based. However, the content of the bid documents can vary widely, based primarily on the project delivery system chosen and the extent of design development required by the contractor to complete a detailed design. Regardless of the project delivery system chosen, the bid documents serve to define the scope of the work to be undertaken as well as the relative responsibilities of the various parties.

Because of the significant variation possible in the nature and quantity of information available in the bid documents, initial or preliminary estimates prepared for individual projects will also reflect wide variation in content and level of detail. For example, lump sum or fixed price Design/Build projects utilizing an Engineer/Procure/Construct (EPC) contract are often awarded only after preliminary design information is available from what is usually called a Front End Engineering Design, or FEED, which can be performed by the owner's engineering staff, the eventual EPC contractor, or by a different engineering contractor. Prior to the preparation of a FEED estimate, and because of the lack of design development in the pre-FEED documents, such pre-FEED project estimates are considered conceptual and generally are not sufficiently detailed to be considered reliable for use as "control" estimates in lump sum or fixed price contracts.[3] Contractors typically develop a "control" estimate as the FEED design effort advances and there is sufficient quantity data and equipment and material specifications available to prepare a fixed price EPC estimate. When the FEED is sufficiently advanced, the control estimate is generally intended to be the actual "baseline" against which actual performance will be measured. It is highly advantageous for the control estimate to be based upon design information that is well advanced as it reduces the level of

[2] Each Project is unique and, depending on the type of project and chosen delivery system, the bid documents will vary in nature and content. However, they typically include, as a minimum, the Invitation to Bid, the Project Specifications, Bid Drawings, Addenda, and a sample contract.

[3] For the purpose of this article, Control Estimates are those that are prepared for the purpose of development of a detailed Work Breakdown Structure (WBS) and allocation of resources for each WBS task. The WBS data is then utilized in the preparation of the Project Schedule (activity breakdowns and resource allocations) as well as the development of the contractor's Earned Value System.

uncertainty related to the accuracy of the estimate.[4] The control estimate may be updated with contract changes and/or scope additions that have occurred subsequent to the lump sum or fixed price contract execution.

It is from these foundation documents that the more specific Project Control documentation will be developed. A summary level discussion of those documents follows.

3.2 PROGRESS AND PERFORMANCE

As noted previously, virtually all contractors that are involved in the construction of complex process industrial projects have internal systems in place for capturing information and data related to the performance of the contract work. For the purpose of this article, such "systems" will be referred to as the Project Management Information System (PMIS). Sophisticated "monitoring" tools are needed because process industrial projects are very large and complex undertakings. They typically include thousands of yards of concrete, thousands of tons of structural and miscellaneous steel, hundreds of unique equipment items, miles of piping and electrical cabling, hundreds of process control devices, and a very sophisticated automated control system. It is not uncommon for such projects to take several years from concept to completion, with construction alone lasting well over two years. As a result, during the course of the project, it is virtually impossible to determine realistic progress, or percent complete, absent a detailed breakdown of the scope of work into reasonably identifiable and measurable work tasks.

Many PMISs are based on commercially available software, while others are based upon proprietary software developed specifically for that contractor. While each contractor has its own version of a PMIS, most share a number of common characteristics. Those common characteristics revolve around the contractor's attempt to accurately measure actual progress, as well as the cost of that progress, throughout project performance. To accomplish that task, the contractor will set up a system of "metrics" or "measurables" associated with the engineering, procurement, and construction phases of the contract. Primary examples of such metrics include quantity tracking, monitoring labor hour expenditures, planned versus actual comparisons by work task and overall progress, earned value evaluations, etc., along with preparing and submitting to the owner frequent project reports and photographs.

Of course the purpose of all of these efforts is to allow the contractor to collect, compile, and evaluate the resulting information in order to reasonably assess progress and performance during the course of the job. In short, is the project on schedule and on budget? The reality of large-scale complex projects is that none are performed precisely in the manner planned. Engineering proves to be more difficult than planned, materials and equipment are delivered later than planned, or not in

[4] For more details regarding types of estimates and classifications, see AACE International Recommended Practice No. 18R-97, "Cost Estimate Classification System – As Applied in Engineering, Procurement and Construction for the Process Industries," Rev. Nov 29, 2011.

the desired sequence, mother nature causes unplanned weather problems, and fabricated equipment may not fit up properly, all of which can impact the contractor's time and cost of performance. Fortunately, because of the scale of such projects, in most cases the likely impact can be eliminated or minimized by use of "workarounds."[5] One of the essential purposes – and primary benefits – of PMIS data is to provide timely and reliable information to allow the contractor to make informed judgments as to any such "course corrections" that routinely occur during the course of the project.

[5] The term "workaround" commonly refers to the performance of certain work out of planned sequence, or in a different manner than planned, in order to overcome or mitigate possible impacts that often arise from a variety of project impacting events.

4. TYPICAL PROJECT DOCUMENTATION DEFICIENCIES AND WHY THEY OCCUR

Unfortunately, despite the sophistication of the PMIS and the massive amounts of data that is often accumulated therein, the resulting information often proves to be insufficiently detailed or inaccurate, and therefore unreliable for supporting a change order request or claim. The reasons for such failures are numerous and unique to each project. Despite the extraordinary level of effort and investment of staff time and expense in setting up and maintaining the requisite project documentation, the result is often far less than that desired or needed. Some common examples include the contractor's failure to contemporaneously:

- Identify and isolate the actual man-hours and costs associated with discrete additional work or discrete instances of inefficiency, such as idle time. Without such detailed records, the contractor's (or its expert's) alternatives are to perform after the fact estimates of the man-hours and costs, or to perform a more global assessment of loss of productivity. Neither alternative is appealing and may significantly reduce the credibility of the claim and the potential recovery.

- Record its actual productivity at an appropriate level of detail. For example, piping installation is typically segregated by pipe size (large bore/small bore), pipe class, system, plant area, etc., and then further broken down by type of work, such as unload/handle, install hangers/supports, erection, and testing. Unfortunately, if records are not kept at such detailed level, it will not be possible to utilize an analytical methodology that correlates specific losses to specific events (Measured Mile or Discrete Damage methods). In such cases the contractor or expert may need to turn to more general or global analyses, such as Total Cost or Modified Total Cost, methods that are not generally favored by arbitration panels and courts except under certain circumstances.

- Document the day-to-day impact of the alleged problems through daily reports, field work orders, and/or notices to the owner. Such detailed records can be extraordinarily helpful (and in many cases essential) in proving both causation and responsibility. If such records include timely and contemporaneous notice to the owner, it also provides a record of "fresh complaint," which is extremely helpful in eliminating typical owner allegations of prejudice related to lack of notice.

In the author's experience, one of the primary reasons for such poor results is that the contractor's personnel simply do not "keep up" with the recordkeeping requirements, or do not take sufficient care to assure that information inputs are reasonably accurate. In fact, one failing can be the cause of others. For example, the responsible personnel have fallen behind in their

efforts and resort to "filling in the blanks" on the various forms and reports to which progress information is input – an unfortunate and ill-advised re-direction of efforts toward "catching up" and away from accurate inputs. While such dilemmas are often driven by deadlines for completion and delivery of project progress reports to the owner, the result is quite predictable: incomplete, inaccurate, and misleading records.

There are numerous reasons that may directly cause or significantly contribute to a contractor's failure to maintain detailed and reasonably accurate project records. Perhaps the most fundamental and often encountered reason is the lack of commitment from the contractor's project team, particularly the site-based construction management team. The team leaders tend to be highly motivated, experienced, and capable managers, but have not "bought in" to the advantages of accurate project records. Many construction managers and project superintendents simply do not agree that such recordkeeping justifies the significant time and effort to perform such tasks properly. Regardless of the specific reason, the site management team does not demand that responsible superintendents and trade foremen properly and consistently record what they are doing, the level of effort (labor hours) utilized, and specific problems encountered. Unfortunately, much of the information that is captured by the PMIS relies upon attention and deliberative input from those individuals, but little is done to assure that it is done timely, accurately, and on a regular basis. The reality is that the demands of the project create a ceaseless competition for the time and attention of these individuals, and unless project controls are a priority, they often are slighted.

In other instances, even when the entire project team is highly motivated to keep proper records, there may be a lack of sufficiently skilled and/or properly trained personnel available to do the necessary work. The PMIS tools are highly technical and require a number of personnel with a level of training and expertise specific to those systems in order to be properly utilized. Unfortunately, individuals with the appropriate training and experience may not be available at the time needed. Such shortages lead to the placement of inexperienced or insufficiently trained individuals into responsible positions for which they are simply not prepared.

In other instances, it appears that some contractors fail to make proper distinctions between data and useful information. While the PMIS may collect a massive volume of data, there often is a lack of a coherent plan as to how the data will be used and for what specific purpose. In order to be actually useful, information must be timely and reliable, but even beyond that, it must convey relevant knowledge or information that can be acted upon in real time. Those involved in performing forensic analyses of project documents have experienced far too many occasions where it was necessary to sift through large amounts of irrelevant data in order to find a nugget of useful information. Perhaps the simplest test to apply when considering whether to capture or monitor particular information is to ask; "what will I know when I know?" In other words, does it really matter? Will it likely affect, to any meaningful degree, decisions that will be made that could have significant consequences for the project? With respect to proper project recordkeeping, the quantity of data is no substitute for quality and relevance.

5. IMPACT OF DEFICIENT RECORDS ON CLAIMS AND ANALYSES

Over the years, numerous studies and technical papers have been published regarding various analytical methodologies[6] that may be utilized in claims preparation and expert analyses, *i.e.*, schedule delay and labor productivity analyses. Each of the respective methodologies, whether related to schedule delay or labor productivity, has different requirements as to the nature and extent of project records needed to support a credible analysis. It is often the availability and quality of those records that dictate the best available methodology to be employed.

By way of example, one of the most universally accepted methodologies for proving loss of labor productivity is the "Measured Mile." In very simple terms, the Measured Mile methodology is based upon a comparison of labor productivity on specific work during a specific period when that work was affected by a specific event or impact, to productivity experienced on that same, or similar, work in an un-impacted period. As the measurement is based on actual performance, it eliminates questions related to the validity of the contractor's estimate. However, to be performed properly, the work being measured must be similar in nature, and the work must not have been impacted by other factors in either the impacted or the non-impacted period unless those other factors affected the un-impacted and impacted periods equally. Unfortunately, in the author's 20 plus years of experience analyzing labor productivity on dozens of process industrial projects, there has not been a single instance where job conditions or project records would allow the proper "textbook" use of the Measured Mile Method of labor productivity analyses. The reason is simple. Large complex process construction projects are subject to numerous unplanned events/ circumstances on a daily basis. There simply exists no significant period during project performance that the work on virtually every trade is not affected by one or more impacts, some of which are caused by the owner, some by the contractor, and some which is not the fault of either, *i.e.*, a *force majeure* event. As a consequence, it is often impossible to find an appropriate "unimpacted" period needed to establish a proper baseline for comparison. Complicating matters even further, for the Measured Mile to be performed properly, the contractor's records would have to have captured the precise information needed to identify productivity on specific elements of work being measured. That requirement also rarely happens. While the Measured Mile may well be the best "theoretical" methodology available to discretely measure labor productivity, it is very rare, if ever, that actual job conditions and project records are such that the method can be utilized without some compromises or adjustments in an attempt to make the analysis reasonable.

The fact is that specific job conditions and the nature and quality of contemporaneous project records vary widely from project to project, even those performed by the same contractor on similar projects. This reality presents a number of challenges to the expert with respect to identifying, quantifying, and proving responsibility and quantifying damages associated with schedule delay and loss of labor productivity. Principal among those challenges is the fact that such projects routinely experience a multitude of delay and impact issues throughout the entirety of the project, and rarely

[6] For the purposes of this article, the analyses discussed are limited to those related to labor productivity.

is one party exclusively responsible for all of the delay and/or impact events. As a result, it is a challenging and time consuming task, even when reasonably accurate and periodic data is available, to identify those events that actually impacted the contractor's performance, and then to quantify the schedule effect and damages arising from those events, and then determine who should properly bear the responsibility for those costs. The task is made appreciably more difficult when the desired data and information is not available.

Aside from the very likely negative impact that the lack of timely and accurate project information can have on the success (or failure) of the project, poor project records also make the expert's job much more difficult, which in turn can increase the cost of preparing and/or defending claims that have progressed to arbitration or litigation. More importantly, however, is that the credibility of analyses based on poor or deficient project records are subject to vigorous attack by the opposition. No matter the underlying merits of the claim, or the competency of the expert, claims founded on demonstrably unreliable records are far more easily discredited. [7]

Claims related to impacts to project progress and performance are in very large part related to the cost of project delays, or extended time of performance, and loss of labor productivity arising from delays and/or disruptions to the contractor's performance of the work. With respect to claims on process industrial construction projects, the most significant damages are typically related to loss of labor productivity, also referred to as loss of efficiency. Loss of labor productivity occurs when the contractor expends more labor hours/costs to complete the work than was estimated or budgeted for that work.[8] Contractors assert claims for loss of productivity when events or circumstances arise that significantly and negatively impact the planned means and methods of performing the work, and for which the contractor believes other parties are responsible.

Among the most common claims for loss of productivity is related to project acceleration, where the contractor takes a number of unplanned actions, such as increasing planned resources, including manpower, increasing planned weekly work hours, working multiple shifts, performing certain work out of sequence, and the like, all in an effort to shorten the duration needed to complete the remaining work.

One type of acceleration is referred to as "directed acceleration," where the owner desires the project to be completed earlier than the current contract completion date requires and directs the contractor to increase resources and/or work additional hours to achieve the desired early completion. Such directed acceleration is typically ordered by a contract change and includes consideration for the additional costs, including loss of labor productivity, associated with the accelerated completion.

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[7] These observations are not intended to suggest that it is not possible to prepare a credible and defensible loss of productivity claims and analyses in cases where the available documentation is less than desired. Experts are routinely called upon to prepare such claims even when the project records are less than ideal. However, after the fact claims crafted from whole cloth, with little support from contemporaneous records will rarely fare well.

[8] The labor budgets must be adjusted to account for any increased volume of work before calculating productivity.

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A second type of acceleration, and far more common with respect to loss of productivity claims, occurs when the contractor believes it has suffered an excusable delay for which he requests an extension in the contract time of performance, but where the owner fails to grant such an extension. The contractor then claims he was "constructively accelerated," because the owner refused to grant a proper time extension thus requiring completion of the work earlier than the contract completion date should have been when properly adjusted for the excusable delay.

In addition to that caused by acceleration, there are numerous other specific circumstances that give rise to loss of productivity that are frequently asserted by contractors.[9] Among those more commonly asserted are related to delays and disruptions to contract work that result from late and incomplete owner responsible engineering and design information, late or out-of-sequence delivery of owner- furnished materials and/or equipment, and excessive change orders and extra work.

Regardless of the alleged causes of the loss of productivity, it is incumbent upon the claimant (typically the contractor) to reasonably substantiate that such losses were the result of events and circumstances for which the owner was responsible and not the result of factors that were the contractor's responsibility. Because labor productivity can be influenced by many different factors, including those for which the contractor is responsible, it is a significant challenge to assess which among the myriad possibilities actually caused the contractor's loss of productivity, and to reasonably determine who should bear the responsibility for any resulting cost increases.

In summary, the claimant will generally be required by most owners, courts, appeals boards, and arbitration panels to first establish entitlement, establish cause and effect, and then to provide a reasonable quantification of the damages. Such "proof" typically requires the contractor to demonstrate that the owner was contractually responsible for the impact event (liability), the contractor to reasonably show that the loss was caused by a particular event or circumstance (causation), and finally to demonstrate that a compensable loss was actually incurred (damages).

[9] For a more detailed listing of typical causes of productivity loss, see AACE International Recommended Practice 25R-03, "Estimating Lost Productivity in Construction Claims," Section B.1, Common Causes of Lost Productivity, April 2004.

6. COMMON METHODOLOGIES FOR QUANTIFYING LOSS OF PRODUCTIVITY

There are dozens of very detailed and well presented studies and professional papers that have been written regarding various methods commonly used to quantify the cost of loss of productivity, some of which are discussed below at a very summary level. Certain methods are considered more reliable than others. For example, AACEI provides that Project Specific Studies, such as the Measured Mile Method, are preferable to the use Industry Studies, which in turn are preferable to Cost Basis methods such as Total Cost or Modified Total Cost claims.[10] In general, the most preferred and effective methods require substantial contemporaneous data and documents from the contractor.

6.1 MEASURED MILE

As discussed above, the methodology most widely accepted as the most probative is the Measured Mile. To utilize a Measured Mile, the contractor must collect accurate productivity data (*i.e.*, actual manhours and installed quantities) over time by specific scopes of work, such that the productivity losses can be linked with the alleged impacting events. However, as discussed above, it is the most difficult to utilize because project conditions rarely provide "unimpacted" periods of performance sufficient to offer a true baseline and because project records are rarely available that can support the detailed and discrete analysis required. It may be possible, however, to make reasonable analyses of certain project productivity data to enable a measured mile analysis to be used to quantify the productivity loss that was caused by events for which the owner is responsible, particularly when the courts have taken the position that a claim does not have to be proven with mathematical certainty, and a reasonable approximation of the damages can often be accepted by arbitration panels and the courts.

6.2 TOTAL COST/MODIFIED TOTAL COST

Perhaps because of those same reasons, it seems that contractors are increasingly utilizing a Total Cost or Modified Total Cost method of calculating damages. The Total Cost method simply compares actual cost of the work to the estimated cost, and utilizes the difference as the basis for its claim. The Modified Total Cost method is much the same, but the contractor makes adjustments to account for estimate deficiencies as well as changes to the work and other contractor-caused or responsible inefficiencies. It should be understood, however, that courts, boards, and arbitration panels do not favor this method and typically impose fairly stringent conditions on their use. The commonly cited conditions include: 1) that more reliable records or means of determining damages (or loss of productivity) are not available; 2) that the contractor's estimate for the work in question was reasonable; 3) that actual costs incurred to perform the work in question were reasonable; and 4) that the owner was contractually liable for the damages claimed.

[10] See "Estimating Lost Labor Productivity in Construction Claims," AACE International Recommended Practice No. 25R-03, Section C. 1, pp. 8 – 10, April 2004.

6.3 INDUSTRY STUDIES

The use of Industry Studies is another common method for quantifying damages associated with loss of productivity. One such study is that published by the Mechanical Contractors Association of America (MCAA), and specifically Bulletin 58 published in 1976 and titled "Factors Affecting Productivity."[11] This bulletin identifies sixteen specific factors[12] that can impact productivity and provides a range of impacts based on the perceived severity of the problem. The use of MCAA factors has received limited support from courts and boards, but its use is not encouraged as a sole means of calculating productivity loss because the productivity factors are by their nature arbitrary and are often applied in a manner inconsistent with the intent. In fact, MCAA specifically advises that the factors are "intended to serve as a reference only."[13]

Other examples of Industry Studies related to construction productivity include the work done by Charles Leonard[14] and Dr. William Ibbs,[15] which attempt to correlate the extent of project change with productivity loss. However, to date, the author is unaware of any published cases where these industry studies have led to a contractor's successful recovery.

Other studies that are often cited in support of loss of productivity claims are those that address specific types of loss. One such well known and frequently cited is a report titled "Schedule Overtime Effect on Construction Projects" published by the Business Roundtable. The relevant finding is that the consistent use of overtime on construction projects causes loss of productivity. The study includes several charts reflecting expected inefficiencies associated with the protracted use of overtime, based on several example of work week hours, *i.e.*, 5 – 10 hour shifts, 6 – 12 hour shifts, etc. The charts reflect that inefficiency is impacted by both the extent and duration of the overtime.

6.4 JURY VERDICT

This method is not recommended and is rarely used, particularly when experts are involved in the preparation and defense of claims. This method simply acknowledges that there is no reliable method available to calculate damages and leaves the determination of damages to the discretion of the court.

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[11] This Bulletin was reprinted by the MCAA in 2005 and again in 2011 under the title of "Change Orders, Productivity, Overtime: A Primer for the Construction Industry." However, the relevant productivity factors were unchanged.

[12] These factors are very similar to those included in AACE Recommended Practice No 25R-03.

[13] "Factors Affecting Productivity," Mechanical Contractors Association of America, Bulletin No. 58, 1976.

[14] See Leonard, Charles A., "The Effects of Change Orders on Productivity," M.S. Thesis, Concordia University, Montreal, Quebec, 1988.

[15] See, for example, Ibbs, William, "Impact of Change's Timing on Labor Productivity," Journal of Construction Engineering and Management, ASCE 131:11, 2005.

6.5 DISCRETE (OR SPECIFIC) DAMAGES ANALYSIS

The Discrete Damages analysis method considers both (i) the contractor's cost overruns against its budget, usually on a detailed cost account basis, and (ii) the costs of specific events or impacts, in an attempt to account for and allocate all of the contractor's cost overruns to the responsible parties.[16]

It is sometimes argued that this method is often akin to the Modified Total Cost method, but is based on review and analysis of project records and the assessment of damages at a far more detailed level. Where the Modified Total Cost method typically assesses losses and responsibility on a more global or project-wide basis, the assessment of damages on a discrete basis attempts to identify causation and responsibility by trade, area, or even at the task level.

The Discrete Damages Method is sometimes confused with the Measured Mile, in that both attempt to correlate specific losses to specific impacts. However, the Discrete Damages method is different from the Measured Mile method in that it compares planned performance to actual performance to identify "losses" whereas the Measured Mile considers only actual performance during specific periods of time.

In order to achieve the level of detail needed to support a Discrete Damages analysis, it is still necessary to have reliable and detailed performance records available. It is also necessary to account for contractor responsible costs such as bid mistakes and defective work, and to adjust baselines for change orders/extra work (approved and pending).

Also, and by way of example, it is well understood and accepted in the industry that all tasks within a particular trade or commodity group are not necessarily the same and do not require the same level of effort or resources. For example, the erection of "heavy" structural steel shapes may require less than 10 manhours per ton, while smaller "miscellaneous" steel may well require 60 – 100 manhours per ton. As a result, it would be completely inappropriate to assess productivity by comparison of such dissimilar work, even though it was within the same trade/commodity group. However, if the contractor has tracked steel erection by "type," it will be possible to determine the labor hours needed to erect each type of steel over time which would allow for the assessment of productivity during discrete time frames. This in turn can be analyzed in the context of specific impacts affecting that work and that occurred during each of those discrete time frames. In this way, the contractor attempts to reasonably correlate a specific or discrete damage to a discrete cause, and is typically considered a reasonable way to establish the required nexus between cause and effect. If it is based on reasonable and reliable records, the results are difficult to refute.

[16] For additional discussion on this approach, see Richard J. Long's article entitled "Discrete Damages/Cost Variance Analysis Method for Quantifying Damages in Construction Claims," found on Long International's website.

One of the often cited disadvantages of utilizing this method is much the same as for the Measured Mile method, *i.e.*, that the project is typically affected by numerous "impacts" on a continuous basis and that the impacts are rarely the sole responsibility of one party. However, because the overall assessment is made at a detailed level, and appropriate adjustments to account for obvious contractor-responsible problems are incorporated, the credibility of the result is typically far higher.[17]

Regardless of the method used, the reality is that loss of productivity claims are the most contentious of all construction-related claims. The nature and complexity of industrial construction projects simply provides endless possibilities to explain away the contractor's poorer than planned labor performance and where the contractor will typically point only to owner-responsible problems, while the owner wants only to talk about the contractor's deficiencies.

While preparing, presenting, and defending loss of productivity claims is difficult, it is not impossible. Fortunately, once causation and responsibility are established, numerous courts and appeal boards have noted that while speculative damages will not be allowed, mathematical precision in the quantification of damages is not required; only that the basis for estimating the costs is reasonable.[18]

That said, there is no escaping the reality that the more detailed and reliable the contractor's labor records are, the more likely it is that the resulting analyses offered in support of the contractor's claim will withstand the scrutiny to which it will be subjected. In addition, and perhaps the greatest value that well-maintained and reliable records may provide, is that they provide a real time basis for informed judgments, a source of reliable information that can be of great assistance to the contractor in successfully navigating the maze of decisions that must be made throughout the project.

Another significant value is that detailed and reliable records allow the contractor to submit more complete and substantive change order requests and claims to the owner during the project. Well-supported requests and claims have a far higher chance of acceptance by the owner than do more speculative claims based on incomplete and unreliable information, which in turn significantly reduces the odds that the project will end up in arbitration or litigation.

[17] In the authors' judgment and experience, when reasonable records are available, the Discrete Damages method is, as a practical matter, the best method of determining loss of productivity on complex industrial projects.

[18] See, for example, *Wunderlich Contracting Co. v. U. S.*, 173 Ct.Cl. 180, 351 F.2d 956.

7. OWNER OPTIONS

From the owner's perspective, one of the essential criteria considered when making a contract award is the expectation that the contractor will perform in a manner commensurate with the skill and experience expected of it. It is then extremely disappointing when the contractor fails to live up to those expectations.

Equally disappointing is when the contractor fails to provide project performance records and status information as promised or in keeping with the contract requirements. The failure to provide such timely and reliable data significantly inhibits the owner's ability to fairly evaluate the contractor's change order requests and claims.

Unfortunately, there seems to be little that owners can effectively do when the contractor fails to provide the quantity and quality of information promised or required by the contract. By the time such breaches become evident, the project is well under way and the time and expense – as well as the legal and commercial risk – of terminating the contractor for such "administrative" failings is simply too great. For much the same reasons, many owners are also reluctant to condition progress payments on receipt of the acceptable records as required by the contract.

The above reality notwithstanding, it is still recommended that owners include detailed and specific contract requirements related to the contractor's provision of performance-related data throughout the course of the project and to include language related to the prejudice to the owner in the event of the contractor's failure to provide the agreed-upon information. It is also suggested that the contract language include a clear admonition that the contractor's promises to provide such information weigh heavily in the owner's decision regarding additional compensation.

Owners are strongly encouraged to work closely with counsel in crafting reasonable and appropriate contract language that makes it clear that the contractor is to provide timely and reliable project performance records and that the owner will consider the contractor's failure to do so to be a material breach of contract.

8. SUMMARY

Contractors engaged in the construction of complex industrial projects possess the corporate infrastructure, including appropriate policies, procedures, and processes that are necessary to collect, compile, and evaluate contemporaneous project data and information related to project progress and performance. In the modern construction world, the contractor that fails to utilize that resource to its fullest extent does so at its peril.

It is entirely understandable that project circumstances will often present significant challenges to the contractor's personnel to provide timely and accurate inputs to the PMIS. However, when the exigencies of the job cause attentions to be directed to other matters such that project records suffer, the inevitable result is the creation of unreliable data upon which critical project decisions are based. When that occurs, the consequences can be profound. The immediate economic impact can be devastating to almost any company, but perhaps equally damaging is the commitment of key resources to prepare and defend construction claims or participate in a protracted arbitration or litigation.

Finally, in those cases where events and circumstances have had significant impact on a contractor's performance, the likelihood of successfully negotiating claims with the owner, short of arbitration or litigation, is greatly enhanced. In the event that arbitration or litigation becomes necessary, proper documentation is critical to the contractor's and/or its expert's ability to effectively present the contractor's case. The availability of reliable records significantly increases the odds of a positive outcome.

The Impact of Poor Contemporaneous Project Records on Claims Preparation and Expert Analyses

About the Author

Ronald E. Downing *is a Senior Principal with Long International, and has 40 years of experience in the management of power, process, industrial, and environmental construction projects, and in the analysis and preparation of construction claims. His direct project management experience includes estimating, contract administration, and the development and implementation of project control systems (cost, schedule, and quality) for ongoing projects. His construction claims experience includes claims evaluation, analysis, and expert testimony related to construction means and methods, technical issues, schedule delays, productivity losses, and the quantification of damages. He has significant experience in the role of project manager in the construction of various systems at heavy industrial and power generation plants throughout the U.S. Process/ Industrial projects include conversion of an open car coke oven quenching system to a closed system, complete rebuild/upgrade of a continuous annealing line, installation of three air separation plants, Flue Gas Desulphurization (FGD) systems, numerous bulk material handling systems, and major process piping installations. This experience has involved all facets of the construction process including foundations, structural erection, equipment erection, and piping installation, and includes new construction as well as repair/renovation work within operating plants. Mr. Downing is based in the Orlando, Florida area and can be contacted at rdowning@long-intl.com and (386) 649-5666.*